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EXAMINER	
MONDT, JOHANNES P	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/750,178	GRODZINS ET AL.	
	Examiner	Art Unit	
	Johannes P. Mondt	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-63* is/are pending in the application.

4a) Of the above claim(s) *14-48,52-57 and 59-63* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,22-25,49-51 and 58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1 (2 pages)*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/23/07 has been entered.

Response to Amendment

Amendment filed 4/23/07 with said Request for Continued Examination forms the basis for this Office Action. In said Amendment applicant substantially amended all elected claims 1-13, 22-25, 49-51 and 58 through substantial amendments of independent claims 1 and 49. Comments on Remarks submitted with said Amendment are included below under "Response to Arguments" (see also "Inforamtion Disclosure Statement" just below).

Information Disclosure Statement

Information Disclosure Statement filed 4/23/07 does not comply with 37 CFR 1.98(a)(3)(i) (item AZ: although examiner reads French the requirement still holds) or 1.98(b)(5) (items BC and BD, having neither location nor specific date and author information) and 1.98(a)(2)(ii) (no copy has been provided for item BE). The Information Disclosure Statement has been placed in the file, and a partial acknowledgment in the

form of a signed copy of Form PTO-1449 is included with this office action. This portion of this action serves as Response to Remarks on "IDS".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. ***Claims 1, 3 and 4*** are rejected under 35 U.S.C. 102(b) as being anticipated by Krug et al (5,600,700).

Krug et al teach an inspection system col. 4 –col. 19, title and abstract) for inspecting an object, the inspection system comprising:

a. an external source **40** (col. 4, l. 64) of illuminating penetrating radiation for generating a beam **45** (col. 4, l. 66) and for irradiating the object, at least intermittently, the beam characterized at each instant of time by an instantaneous energy spectrum (col. 4, l. 65) and an intensity that may be substantially zero (the adverb "substantially" is extremely broad, allowing any neighborhood of zero to comprise an intensity level meeting the claim; while, moreover, the fan beam by Krug et al is pulsed, hence has intensity near zero at least some of the time: see col. 4, l. 65);

b. at least one detector **60/80** (col. 4, l. 66 – col. 5, l. 28) configured to detect penetrating radiation including, but not limited to, penetrating radiation backscattered by the object (through detector component **80**) (col. 5, l. 2), and to generate a detector signal (through photomultiplier tube **88**: see col. 5, l. 40);

c. a processor **91/92/93/95/97** (col. 5, l. 36-39) configured as a detector signal discriminator to receive the detector signal (col. 5, l. 40-47), generate an x-ray image (col. 15, l. 16-23) based at least on the illuminating penetrating radiation backscattered by the object (col. 14, l. 45-50 and col. 15, l. 3-15), and generate an output indicating whether the detector signal is triggered at least in part by an origin other than the illuminating penetrating radiation backscattered by the object (through a/o recognition routines also taking into account transmitted radiation (through transmission detector 60 (col. 4, l. 67), transmission signals being taken into account: see col. 9, l. 6-27, col. 11, l. 34-41 and col. 14, l. 50 – col. 15, l. 23).

On claim 3: the detector signal discriminator **91/92/93/95/97** generates output based on source- and detected signal timing (inherent in any imaging through interrogation by irradiation is that the detected signal be related in time to the source that causes said detected signal) and induced spectral content (col. 6, l. 31-42).

On claim 4: the external source **40** generates a beam that irradiates the object intermittently and has an intensity that is intermittently and substantially zero (see discussion under a. within the rejection of claim 1 and the rejection of claim 3; see also col. 4, l. 65), and wherein the processor generates output based on source- and detected signal timing (inherent in any imaging through interrogation by irradiation is that the detected signal be related in time to the source that causes said detected signal, see also col. 15, l. 3-15 for actual teaching).

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. ***Claims 49-51 and 58*** are rejected under 35 U.S.C. 102(e) as being anticipated by Annis (6,347,132 B1), henceforth referred to as "Annis2".

Annis2 teaches a method for creating an x-ray image of an object and detecting clandestine nuclear material associated with the object (title, abstract, and col. 5, l. 1-9; more generally see Figure 4 and cols. 2-5), the method comprising:

a. illuminating the object with penetrating radiation (through X-ray source 14) (Figure 4 and col. 4, l. 49-59; which refers to col. 2, l. 36 – 42);

b. detecting emission, including penetrating radiation, emanating from the object (through backscatter detector 104: see col. 4, l. 54-55);

c. producing an x-ray image of the object based on detection of penetrating radiation scattered by the object (col. 3, l. 43 – col. 4, l. 5 and col. 5, l. 1-9); and

d. distinguishing between detected penetrating radiation scattered by the object and detected emission due to the clandestine nuclear material (col. 3, l. 59-63).

On claims 50-51: distinguishing includes distinguishing detected emission due to fissile material (U and Pu: see col. 4, l. 60 – col. 5, l. 9), including inherently emission

due to a dirty bomb, because dirty-bomb material does not distinguish over enriched material chemically, including inner-shell atomic energy levels responsible for X-ray absorption and emission.

On claim 58: illuminating the object (see Figure 4) involves scanning, thus illuminating each object intermittently (see also col. 2, l. 58-61), and distinguishing includes distinguishing based on at least the source and signal timing (to identify areas of high absorption the correspondence of detection time and source (emission) time has to be known, hence the claimed "timing" needs to exist for the identification of the areas of high absorption identified by the method (col. 3, l. 43- col. 4, l. 5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. ***Claims 1-3, 6-8, 13 and 22-24*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al (5,098,640) in view of Swift et al (5,903,623).

Gozani et al teach an inspection system for inspecting an object, the inspection system comprising:

(a) an external source of penetrating radiation (fast neutrons and x-rays; see col. 14, lines 13-31, col. 12, lines 19-47, Figures 4, 5A, and 5B; please note lines 45-47 of

col. 12 in particular, indicating the inclusion of an x-ray system in the same housing as the nuclear portion) for generating a beam and for irradiating the object, at least intermittently, the beam characterized at each instant of time by an instantaneous energy spectrum (namely: the energy spectrum of fast neutrons and x-rays) and an intensity that may be substantially zero (because induced nuclear reactions and x-ray imaging do not necessarily rely on a minimum flux of irradiation (note the claim language recites "may be", not must be or should be).

(b) at least one detector 178 (gamma ray detector: see col. 14, lines 45-62) configured to detect penetrating radiation (see Figure 5B), and to generate a detector signal (through detector 178 and the inherently present x-ray detector since otherwise no x-ray imaging can be performed (see final sentence of abstract)); and

(c) a processor (including 148 and 154: see Figure 4) configured as a detector signal discriminator (by analysis of the spectral content: see col. 13, lines 16-46 and col. 14, lines 63 – col. 15, lines 12) to receive the detector signal (inherent for any specific gamma ray detector and any specific x-ray detector), generate an x-ray image (from the x-ray ray detector), and

generate output indicating whether the detector signal is triggered at least in part by an origin other than the illuminating penetrating radiation backscattered by the object (as otherwise the result of the interrogation by irradiation would indicate no gamma ray sources).

Gozani et al do not necessarily teach the limitation that the penetrating radiation detected by said detector is to include illuminating penetrating radiation backscattered

by the object, but only because the positioning of the x-ray detector is not necessarily on the same side of the object 134 as the gamma ray detector 178, because if the latter were the case than 178 were a combined gamma ray and x-ray detector in essence, and the penetrating radiation inclusive of x-rays backscattered by the object would indeed be detected by said combined detector.

However, it would have been obvious to include said limitation in view of Swift et al, who, in a patent on x-ray inspection using penetrating radiation and hence analogous art with regard to what is missing in the teaching by Gozani et al, teach that x-ray backscatter imaging offers unique inspection capabilities because inter alia (1) images can be taken even if the object is accessible only from one side, (2) backscatter images are indicative of a narrow slice because of rapid fall off with distance, thus providing more localized information than transmission images, and (3) alignment requirements for backscatter x-ray imaging is less demanding than for transmission x-ray imaging (see col. 4, l. 49 – col. 5, l. 5). *Motivation,* for inclusion of the teaching by Swift et al in the invention by Gozani et al in the above regard, stems directly from the listed advantages ad (1) – (3).

On claim 2: in the combined invention the source of penetrating photon (namely: x-ray) radiation has energy in "substantial excess of 200 keV" (see col. 10, lines 44-46). The range of the prior art is thus seen to substantially overlap the range as claimed (< 250 keV). Applicant is reminded that a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art or when the ranges of a claimed composition do not overlap but are close enough such

that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

On claim 3: the detector signal discriminator generates output based on source- and detected signal timing (inherent in any imaging through interrogation by irradiation is that the detected signal be related in time to the source that causes said detected signal) and induced spectral content (col. 14, line 63 – col. 13, line 12).

On claim 6: the detector signal discriminator generates an output when the origin includes gamma rays from the object (see gamma ray detector 178 in Gozani et al; see col. 14, lines 45-62).

On claim 7: in at least one embodiment the detector signal discriminator generates an output when the origin includes neutrons from the object; note that the additional neutron detectors are placed at the detector positions (col. col. 15, lines 59-64).

On claim 8: the at least one detector (detector 178 in Gozani et al; col. 14, lines 45-63) includes a segment having selective energy sensitivity because spectral lines (see col. 14, lines 64-68) can be identified by said detector.

On claim 13: the system by Gozani et al further comprises a current-integrating circuit 148/154 to receive the detector signal of the at least one detector (col. 15, lines 13-32); and a pulse-counting circuit configured to receive the detector signal of the at least one detector, and to operate during a period when the instantaneous energy intensity is substantially zero intermittently (col 15, lines 43-52), the latter limitation

following from the circumstance that pulses are necessarily analyzed immediately after they have run their course.

On claims 22-24: the instantaneous energy spectrum of the source is capable of exciting characteristic emission lines of fissile elements (said source as defined above under the rejection of claim 1 over Gozani et al includes fast neutrons at E> 6.7 MeV capable of penetrating a heavy nucleus and causing gamma emission which inherently is line emission (see abstract of Gozani et al). That fast neutrons of the order of 1MeV or higher are capable of causing inelastic scattering with heavy nuclei is explained in Blatt et al ("Theoretical Nuclear Physics", Chapter IX. "Nuclear Reactions: Comparison with Experiments", section D (pages 480-481)).

1. ***Claim 4*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al and Swift as applied to claim 3 above, and further in view of Armistead (5,838,759).

As detailed above, claim 3 is unpatentable over Gozani et al in view of Swift et al. Neither necessarily teach the further limitation defined by claim 4. However, it would have been obvious to include said further limitation in view of Armistead, who, in a patent on a photoneutron /x-ray imaging system for irradiation interrogation of objects, hence analogous art, teaches that the external source generates a beam that irradiates the object intermittently with x-rays and pulsed (hence also intermittent) "photo-neutrons" (by which inventor means: neutron-induced gamma ray spectroscopy, hence analogous in this respect; see col. 2, lines 38-44) (col. 2, lines 37-66) and thus has an intensity that is intermittently substantially zero (namely in between on-state for x-rays

and in between pulses for the photoneutron beam), and the processor generates an output based on source- and detected-signal timing ((inherent in any imaging through interrogation by irradiation is that the detected signal be related in time to the source that causes said detected signal). *Motivation* is the teaching by Armistead of the advantage that a pulsed system is reasonably compact and inexpensive (col. 2, l. 44-47).

2. ***Claim 5*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al and Swift et al as applied to claim 1 above, and further in view of Czirr (5,734,166).

As detailed above, claim 1 is unpatentable over either Armistead in view of Swift et al or Gozani et al in view of Swift et al, none, however, necessarily teaching the further limitation as defined by claim 5. However, it would have been obvious to include said further limitation in view of Czirr, who, in a patent on neutron detectors (title and abstract) teaches the inclusion of a beta radiation detector supplementing the gamma scintillator NaI type radiation detector also used by Gozani et al (see Gozani et al, col. 14, line 63 – col. 15, line 7) in order to distinguish gamma radiation emanating from the object from the background gammas radiation using coincidence. *Motivation* to include the teaching by Czirr in the invention by Gozani et al derives from the resulting discrimination between background gamma radiation and gamma radiation from the object.

3. ***Claims 9-11 and 25*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al and Swift et al as applied to claim 1 above, and further in view of Annis (4,809,312).

As detailed above, claim 1 is unpatentable over Gozani et al in view of Swift et al. Neither of these references necessarily teach the further limitations defined by claims 9-11.

However, it would have been obvious to include said further limitations in view of Annis, who, in a patent on producing tomographic images using x-rays, hence analogous art, teach the use of a chopper wheel 32 to temporarily gate the x-ray beam 31 from x-ray source 30 so as to create a pencil beam (hence meeting claim 25) thus increasing localization of the measurement (see col. 6, lines 8-27 and Figure 1), said localization being ample *motivation* for inclusion of the teaching by Annis in the combined invention by Gozani et al and Swift, because any positive signal is more useful when more localized, which is achieved through the pencil beam shape.

4. ***Claim 12*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al, Swift et al and Annis as applied to claim 9 above, and further in view of Resnick et al (6,215,842 B1).

As detailed above, claim 9 is unpatentable over Gozani et al in view of Swift et al and Annis, none necessarily teaching the further limitation defined by claim 12.

However, it would have been obvious to include said further limitation in view of Resnick et al, who, in the art relevant for the specific limitation defined by claim 12, namely teach the electronic gating of an x-ray source 20 (col. 4, lines 52-65) as an

alternative to shutters, of which chopper wheels are special cases. Resnick et al thus shows the use of electronics to achieve gating of x-ray sources to be a well-known alternative and hence must be considered to be a design choice.

Motivation to include the teaching by Resnick et al at least follows from the inherent saving of power because, unlike in the case when the source is gated by a chopping wheel the power of the source is off between pulses of irradiation.

5. ***Claim 2*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Krug et al (5,600,700) in view of Applicant's Admitted Prior Art (henceforth referred to as 'AAPA'). As detailed above, Krug et al anticipated claim 1.

Krug et al do not necessarily teach the further limitation defined by claim 2. However, it would have been obvious to include said limitation in view of AAPA, who teaches that X-ray sources based on X-ray systems with energy less than 250 keV are typically employed by airport installations (see page 6, lines 22-24). It would have been obvious to include the teaching by AAPA in the invention by Krug et al because Krug et al already employ a low energy X-ray source ("low energy" source: see col. 6, l. 17-30) and compliance with airport installation practice facilitates adoption of the invention within the already existing X-ray installations at airports, thus constituting economic advantage.

Response to Arguments

Applicant's arguments in Remarks filed 4/23/07 have been fully considered but they are not persuasive. Specifically, in response to comments under "IDS" see Information Disclosure Statement overleaf.

With regard to "The claims (49-51 and 58 rejected for anticipation", see new rejection under 35 USC 102(e) over Annis (6,347,132 B1) necessitated by amendment.

With regard to "Obviousness in view of Swift taken to stand for backscatter imaging", applicant only comments specifically on claim 1. Applicant's allegation on "universal combination taught by Swift with any other technology is not always desirable, nor is it obvious" is not to the point of the rejection, which merely requires combination and obviousness with regard to the rather specific invention of the primary reference. Applicant continues next to traverse specifically the combination Gozani-Swift by stating that "use of a single detector to detect scattered particles from the illuminating beam and other particles that arise spontaneously from within the interrogated object is nowhere taught by Gozani et al, along or in combination with Swift. However, applicant does not herewith address the claim language, in which no single detector has been recited. The implication of applicant's comments on page 15, first paragraph ("neutron-induced gamma rays of Gozani et al from the x-ray backscatter of Swift") appears oblivious of the presence of an x-ray system in addition to the neutron system in Gozani et al, as pointed out in the action, and on which applicant does not comment (see page 4, lines 17-19 of the office action mailed 10/23/06).

Applicant's next statement, "Moreover, the claimed invention requires a detector signal triggered, at least in part, by an origin other than the illuminating penetrating radiation" (page 15), is incorrect: the claim language only requires the same "by an origin other than the illuminating penetrating radiation *backscattered by the object*".

Because transmission detectors input is part of the output generation the limitation is met.

Applicant's next statement on what the neutron detector of Gozani does not do does not appear to correspond to any statement in the office action in the affirmative on this matter, and hence said statement is not understood.

Applicant's final statement on Gozani et al (that the present invention teaches detection during the "off" period does not appear to correspond with any of the limitations included in the claim under discussion either.

Therefore, the rejection of claim 1 over Gozani in view of Swift stands.

Examiner agrees with applicant on his comments on Armistead on his statement of avoidance of x-ray flash., which could be interpreted as a teaching away of the reliance on the detection of backscatter of the x-rays. However, Armistead's teaching of pulsed sources is independent of it and has obvious advantage regardless of whether backscatter detection is involved. Therefore, the reference to Armistead on a rejection of claim 4 is maintained.

However, line emission from both uranium and plutonium is anticipated through the inclusion of fast neutrons through the resulting gamma emission, as explained in the rejection of claims 22-24 overleaf.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JPM
July 7, 2007

Primary Patent Examiner:
Johannes Mondt (TC3600, Art Unit: 3663)